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DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
12 COMMERCE DRIVE, CRANFORD, NEW JERSEY 07016-1101 (201) 272-8300

June 9, 1988

Ms. Janet Feldstein
SCP - Carlstadt Project Officer
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Re: Revision No. 8
Project Operations Plan
SCP Site Remedial Investigation
Carlstadt, New Jersey

Dear Ms. Feldstein:

The following revisions to the March 4, 1987 Project Operations Plan (POP) are based on our meeting of May 17, 1988 and address the installation of nine off-site wells (five in the water table aquifer and four in the till aquifer).

1. Add new Section 7.15:

7.15 OFF-SITE MONITORING WELL INSTALLATION

7.15.1 Objective

The objective of this task is to install ground water monitoring wells beyond the SCP site boundaries. The purpose of the monitoring wells is to evaluate the off-site ground water quality. Boring logs from the wells, along with chemical analysis of ground water samples and in situ permeability (Slug) testing, will provide information related to subsurface geology and aquifer characteristics in the area. Proposed monitoring well locations are shown in Figure 7-8 (water table aquifer) and in Figure 7-9 (till aquifer).

7.15.2 Preparatory activities

The drilling contractor will be contacted prior to initiation of site work to review the scope of work. The scope of work is based on our current knowledge of site hydrogeology. All permits, licenses, approvals, certificates and authorizations required will be obtained prior to initiation of field activities (except for well permits, which may require an NJDEP waiver of owner signatures). An underground utility search will be requested prior to initiating any field activities. In addition, before well installation is initiated the On-Site Coordinator will meet with the appropriate owner representatives to locate and mark

the proposed well locations. At the same time, photographs of the well locations and their environs will be taken to document the pre-drilling condition of each well site.

7.15.3 Field Equipment

Field equipment to be used for this task include some or all of the following:

1. Stainless steel knife, trowel, or spatula.
2. Photoionization detector and/or organic vapor analyzer.
3. Boring log sheets.
4. Decontamination detergents.
5. Distilled or deionized water.
6. Sample jars and labels.
7. Stakes and marking flags.
8. Electric water level indicator.
9. Required health and safety clothing and equipment.
10. Brushes.
11. Submersible and centrifugal pumps, with matching piping and all required plumbing supplies and tools.
12. Electrical generator.
13. Gas can, gas and oil.

7.15.4 Personnel Protective Equipment

Protective equipment and clothing required is outlined in the site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.15.5 Procedures and Site Management

The field geologist/engineer is responsible for the proper installation of the monitoring wells.

7.15.5.1 General Monitoring Well Installation Procedures

All monitoring wells will have state permits and will be installed under the supervision of an experienced field geologist/engineer and drilled by a licensed well driller registered in New Jersey. Well installation will be in accordance with NJDEP monitoring well specifications. Monitoring well requirements are listed in Table 7-2. Typical well installations are shown in Figure 7-2.

7.15.5.2 Cleaning

Prior to arriving on site, the drilling contractor will certify that the drill rig, tools and any downhole components or materials have been steam-cleaned since their last use. An on-site controlled decontamination area will be selected for steam cleaning. The lower part

of the drill rig and drilling tools will be steam-cleaned at the decontamination area before initiating drilling. Steam cleaning will be done between each boring and at the conclusion of the drilling program at the on-site controlled decontamination area. Rinse water from all on-site decontamination of down-hole drilling tools will be collected and stored in DOT-approved drums on site until final disposition of liquids is determined. Additionally, the driller will clean the water tank and rinse it with potable water prior to drilling the first boring.

7.15.5.3 Drilling Operations

Vegetable shortening will be used to grease auger and drill rod threads; auger grease is unacceptable. Split barrel soil samplers will be used for unconsolidated formation sampling. Upon the discretion of the field geologist/engineer and if the conditions warrant, split barrel samples of cohesive soils can be substituted by undisturbed (Shelby tube) samples of the same materials. If necessary, bedrock will be cored continuously up to 10 feet with an NX size, double barrel coring device.

All deep borings will be sampled continuously (every 2 feet) to the top of the till stratum; sampling within the till will be performed at 5-foot intervals of depth. The sampling frequency within the till stratum may be increased at the discretion of the field geologist/ engineer. Shallow borings not adjacent to a deep boring will be sampled continuously (every 2 feet) to the design depth. Shallow borings adjacent to a deep boring will not be sampled.

During drilling operations, a PID or OVA will be used to monitor the airspace directly above the borehole. These readings will be recorded on the boring log corresponding to the depth of penetration.

7.15.5.4 Monitoring Well Installation

The monitoring wells will be installed in oversized boreholes, which will be advanced using hollow-stemmed augers, wash or mud rotary techniques.

Monitoring wells will be constructed using 4-inch nominal diameter stainless steel. Type 316 stainless steel will be used for the shallow wells, while Type 304 stainless steel will be used for the deep wells, because the chloride content of the lower aquifer is expected to be lower (see Reference 3 in Section 3.4). Schedule 5 riser pipe will be used for all wells. Well screen slot size will be 0.020-inch, and the well screen length will be determined by the field geologist/engineer.

All well casing and screen will be steam-cleaned prior to installation.

Till aquifer wells will be double-cased through the water table aquifer.

Screens and riser pipes will be installed in the completed boreholes and the annular space around the well screens will be backfilled with a clean sand pack of 90 percent by weight larger than the screen slot size. The sand pack will extend 2 to 3 feet above the top of the well screen. Measurements will be confirmed with a weighted tape or small diameter pipe.

A bentonite seal, 2-3 feet thick, will be placed in the annular space above the sand pack. Bentonite pellets, 1/4-inch in diameter, will be used to form the seal. Measurements will be confirmed as with the sand pack.

If shallow water table conditions are encountered the sand pack of the water table (shallow) wells will extend only six inches above the screen and the bentonite seal will extend six inches above the sand pack. In the event that a thicker unsaturated zone is encountered, these numbers will be adjusted accordingly.

The remainder of the annular space, if any, will be grouted using a cement/bentonite grout. The grout will be emplaced using the tremmie pipe method. A lockable protective steel casing will be set in a cement collar placed above the grout. It is expected that some wells will be completed with a flush-mount, watertight, locking manhole. Because the water table is very close to the ground surface, the protective casing of the shallow wells will be installed so as not to interfere with the well screen and will be stabilized at the surface.

All well casings will be surveyed to the nearest one-hundredth (0.01) of a foot referenced to mean sea level and located horizontally. A permanent mark will be placed on the casing as a reference point for future water level measurements. A permanent well identifier will be placed on the protective casing.

Well construction will be summarized on the boring log with a detailed sketch. Cuttings, well and drilling fluids will be disposed adjacent to the well where they came from. Precautions will be taken to avoid discharging well and drilling fluids into Peach Island Creek or any other surface water bodies. If, for aesthetic or space problems, soil cuttings, well or drilling fluids cannot be disposed on the ground around the well, they will be containerized (drummed) and brought on-site where they will be emptied on the ground. At the same time, any cuttings, well or drilling fluids that are currently stored on-site will also be emptied onto the ground. Following completion of the installation of the off-site wells, the well sites and any access ways or other areas affected by the drilling and sampling activities will be restored to their pre-drilling condition.

7.15.5.5 Screen Locations

The field geologist/engineer will select the well screen intervals based on actual geologic conditions encountered during drilling operations. General guidelines for both shallow and deep monitoring wells are as follows:

a. Shallow Monitoring Wells: Well screens to extend from 2 feet above the static water level to either 8 feet below the static water level or the top of the clay layer, whichever occurs first. Because of the shallow water table, space limitations must be considered when selecting the length of the screen.

b. Deep Monitoring Wells: Well screens to extend from 2 feet into the bedrock to either the top of the glacial till layer or a maximum screen length of 15 feet, whichever occurs first. If either the clay or till are absent, the screen will be placed in the upper 10 feet of bedrock.

7.15.5.6 Sampling and Logging

Overburden sampling will be performed using a split barrel sampler. A representative section of each sample retrieved will be placed in a separate jar and labeled. If a major change in soil type occurs within a sample, each soil type will be placed in a different jar and labeled. The field geologist/engineer will log each sample on the boring log. There will be no samples collected for chemical analysis.

A scan of the head space air quality from each field sample jar will be taken 10-15 minutes following collection with a photoionization detector and/or an organic vapor analyzer. Results of these scans will be recorded on the boring log.

After each use, the sampler will be cleaned using the following procedure:

1. Wash with a low phosphate detergent.
2. Tap water rinse.

7.15.5.7 Development and Testing of Monitoring Wells

Well Development

Each well will be developed after completion of installation for approximately one hour using a submersible pump for the deep wells and a centrifugal pump for the shallow wells. Alternatively, double pipe air-lifting or surge block techniques may be utilized, if the wells yield only small quantities of water, or if satisfactory development cannot be obtained by overpumping.

Pumping rates will be adjusted to avoid damage to the sand pack. The discharge rate during development should be estimated by using a 5-gallon bucket and a stop watch. Development should be continued until all but trace amounts of fines and suspended solids are visible in the discharge water. All development water will be diverted away from Peach Island Creek or any other surface water body.

Well Testing

In situ permeability testing will be performed in each of the monitoring wells to estimate the permeability in the vicinity of each well. These data will be used in conjunction with the water levels and hydraulic gradients to estimate geohydrologic conditions at the site.

The method of well testing will be based upon the well production capability as determined by discharge rates during well development. Methods which may be used are 1) slug test and 2) injection test.

A slug test will be performed by introducing a cylindrical "slug" of known volume into the well. The water level is periodically monitored until initial static water level is reached. Slug tests will be performed after well development.

If the water bearing units are too permeable to yield meaningful slug test results, or if the slug test results indicate the need for further testing, an injection test will be performed by pumping water into the well at a known constant rate. Water levels will be monitored periodically until the well equilibrates. Injection tests will be performed after water samples are collected to avoid dilution of actual contaminant concentrations, if any, in the ground water.

7.15.5.8 Water Level Measurement Procedures

Water level measurements will be taken to the nearest 0.01 foot utilizing portable reel-type electronic water level probes. The water level is measured by lowering the electrode until the instrument sounds an audible alarm indicating the tip is in the water. The procedure is as follows:

1. Turn toggle switch to "on" and check battery by pressing test button.

2. Identify the installation (piezometer, well) designation and insert probe into desired tube.

3. Lower the probe into the tube by unreeling the tape until audible alarm sounds.

4. Record depth to water directly from the insulated tape read from the reference point on the installation.

7.15.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.15.7 Field Investigation Team

Dames & Moore and its well drilling subcontractor will perform all activities associated with the installation of the monitoring wells. The field investigation team will consist of the following individuals and/or positions:

- o On-Site Coordinator
- o On-Site Health & Safety Officer
- o Field Geologist/Engineer
- o Driller and helper

7.15.8 Schedule

It is estimated that eight weeks will be required for completion of this subtask following drilling subcontractor notification to proceed. This time includes a two-week mobilization notice to the driller and six weeks well installation time.

7.15.9 Ground Water Sampling

7.15.9.1 Objective

The objective of the ground water sampling program is to collect representative samples from the off-site monitoring wells. Chemical analysis of the ground water samples will provide information that will be used to evaluate off-site ground water quality.

Ground water samples from the off-site monitoring wells will be collected 14 days following the installation and development of the wells. The samples will be analyzed for the parameters listed in Table A-2 (Revision No. 2, October 26, 1987). In addition, Total Dissolved Solids and Chlorine Ion Concentration will be determined. One sample will be submitted for analysis in duplicate. Daily field and trip blanks will also be collected and submitted for analysis.

7.15.9.2 Preparatory Activities

The On-Site Coordinator will ensure the following:

- o Sample locations have been identified;

- o Necessary pre-mobilization arrangements with the laboratory have been made;
- o Field equipment is operational; sample equipment is pre-cleaned; and
- o Monitoring wells have been properly developed.

7.15.9.3 Field Equipment

Equipment to be used in this task may include some or all of the following:

1. Electric water level indicator
2. Plastic buckets, 1, 3, and 5-gallon
3. Photoionization detector and/or organic vapor analyzer
4. Field Sampling Records
5. Well keys and gate keys
6. Stainless steel or teflon bailers with bottom check-valve
7. Ice or freezer packs
8. Polyethylene drop cloths
9. Paper towels
10. Distilled or deionized water
11. Cleaning solvents
12. Generator
13. Gas can, gas and oil
14. Submersible and/or centrifugal pump and all necessary piping, attachments and tools
15. pH meter, conductivity meter, temperature probe or thermometer
16. Rinse bottles
17. Collection can/tub

7.15.9.4 Personnel Protective Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.15.9.5 Air Quality Monitoring

The purpose of air quality monitoring during ground water sampling, in addition to health and safety purposes, is to detect possible airborne contaminants which may affect the sample quality as well as volatiles leaving the well.

Prior to sampling, air quality monitoring will be performed with a photoionization detector and/or an organic vapor analyzer. This will include monitoring upwind of the well, downwind, and at the well. Readings will be recorded on the Field Sampling Record (Figure 7-4).

7.15.9.6 Procedures and Site Management

The On-Site Coordinator is responsible for the ground water sampling task. The analytical laboratory will provide the sample containers with the shipping containers (shuttles). Containers, and any preservation chemicals added to the containers, will be in accordance with EPA protocols (Appendix E). Dames & Moore will provide split samples to the EPA's designated representative upon request.

The following outlines monitoring well sampling procedures:

1. Measure to 0.01 ft. and record the static water level in the well with an electric water level indicator. Rinse off the indicator probe with deionized/distilled water after each use to avoid cross contamination between wells.

2. Open the sample bottle shuttle from the laboratory and inspect the bottles to make sure all the required bottles are present and labeled.

3. Attach the dedicated polyethylene suction hose for the well to the submersible pump. Lower pump into the well so that foot valve is approximately opposite the middle of the well screen.

4. Pump out a minimum of three well volumes. Adjust the flow rate to avoid damage to the sand pack and, if at all possible, avoid pumping the well dry. However, if the yield of the well is too low, the wells will be purged dry and sampled within three hours of reaching equilibrium.

5. The purged water will be discharged to the ground surface, ensuring that the water is diverted away from Peach Island creek or any other surface water body.

6. Remove pump and suction hose from well and disconnect suction hose from the pump. Discard suction hose.

7. A dedicated pre-cleaned stainless steel or teflon bailer, with its own attached dedicated length of polypropylene line, will be used for each well, and is to be stored in separate, labeled, heavy duty aluminum foil (shiny side out).

8. Remove the bailer and line from the foil and lower it slowly down into the well by means of the dedicated length of polypropylene line. A reel may be used to hold the line, or the line may be lowered and raised by hand with the slack portion of the line left to lie in a clean large cardboard box placed next to the well. The bailer should be lowered until it is approximately opposite the well screen. At the completion of the sampling of a well, the bailer will be completely rinsed with distilled water and the polypropylene line discarded. For

each well sampled, the bailer should be handled with a new pair of disposable plastic surgical gloves. Water samples should be carefully transferred from the bailer to the sample bottles to minimize the potential for aeration of the sample, especially those designated for volatile organics analysis (VOA). No head space in the VOA sample bottles is allowed, so special care must be taken in filling and capping these bottles.

9. Make sure that all sample bottle caps are on snugly, but take care not to overtighten them.

10. Label the sample bottles, being sure to include: sample number and type, the name of the sample taker, the date and time, the owner, the name of the site, the well number, the depth at which the sample was taken, analysis required, sample volume, and preservatives added, if any.

11. Complete the Field Sampling Record (Figure 7-4).

12. Pack the sample bottles in the shuttle with ice.

13. Complete the Chain of Custody Form from the laboratory.

14. Seal the shuttle.

15. Store the shuttle in a cool location for temporary storage before transport.

16. Collect an additional sample for field tests. Perform the following field tests: pH, conductivity and temperature. Record results.

17. Lock well caps.

18. Deliver the shuttle to the laboratory within 24 hours.

Both a filtered and unfiltered metals sample will be collected from each monitoring well. The filtered sample will be field-filtered through a 0.45 um membrane filter. Sample will be discharged directly through the filtering apparatus into the container prepared by the laboratory for heavy metal samples.

All equipment used in collecting the sample which may be used in subsequent wells will be cleaned prior to reuse by the following procedure:

1. Wash with a low phosphate detergent.
2. Tap water rinse.
*3. Rinse with 10 percent nitric acid solution.
4. Tap water rinse.
5. Methanol followed by hexane rinse.

6. Deionized/distilled water rinse.
7. Air dry.

*Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

Only the exterior of the submersible pump will be cleaned with solvents. The inside of the pump will be cleaned by pumping a detergent solution through the pump followed by deionized/distilled water. Bailers will be dedicated to each well. Hoses, tubing and polypropylene line will be dedicated to each well and discarded upon completion of sampling.

7.15.9.7 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.15.9.8 Field Investigation Team

Dames & Moore will collect the ground water samples. The sampling team will consist of the following individuals and/or positions:

- o On-Site Coordinator
- o On-Site Health and Safety Officer
- o Field Technician(s)

7.15.9.9 Schedule

The off-site wells will be sampled 14 days after development. The sampling effort is expected to last four days.

-oOo-

If you have any questions of comments, please feel free to contact us.

Very truly yours,

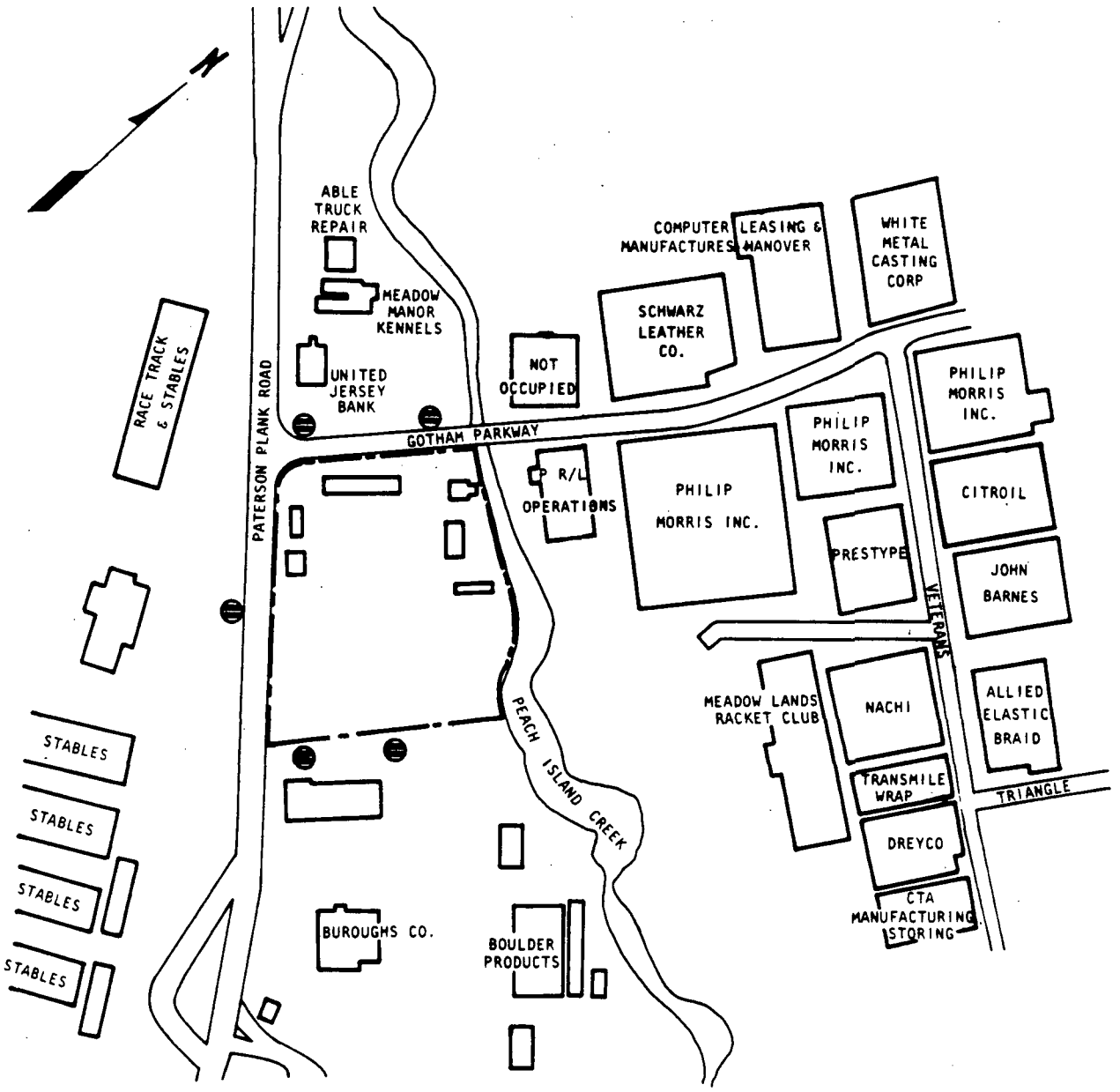
DAMES & MOORE

Gerard M. Coscia
Associate

GMC:jp

Attachments

003708



PROPOSED
OFF-SITE WELL LOCATIONS
WATER TABLE AQUIFER

SCP SITE
CARLSTADT, N.J.

0 500 FEET
(APPROXIMATE)

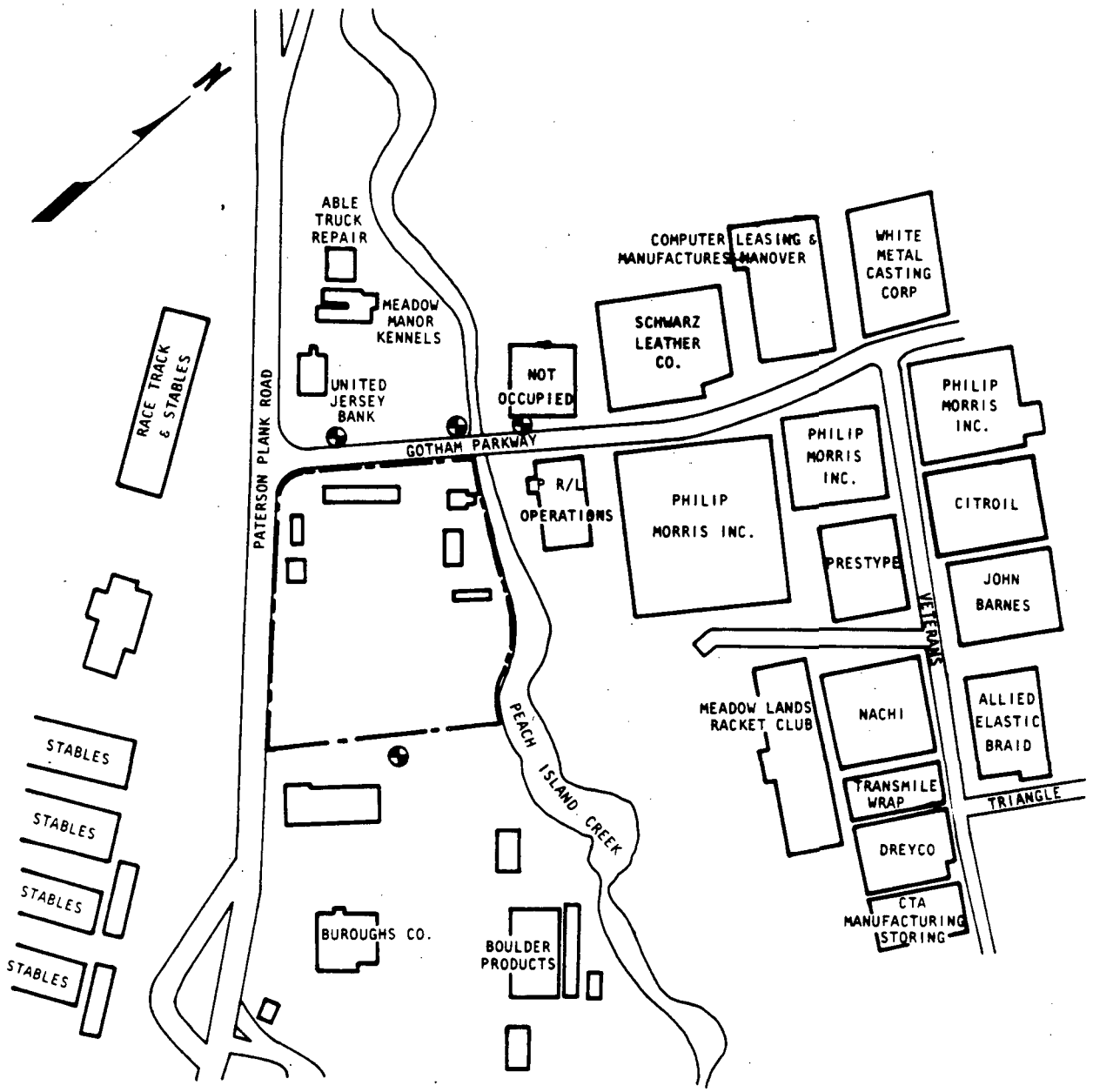
003709

KEY:

● PROPOSED SHALLOW WELL LOCATIONS

Dames & Moore

FIGURE 7-8



PROPOSED
OFF-SITE WELL LOCATIONS
TILL AQUIFER

SCP SITE
CARLSTADT, N.J.

0 500 FEET
(APPROXIMATE)

003710

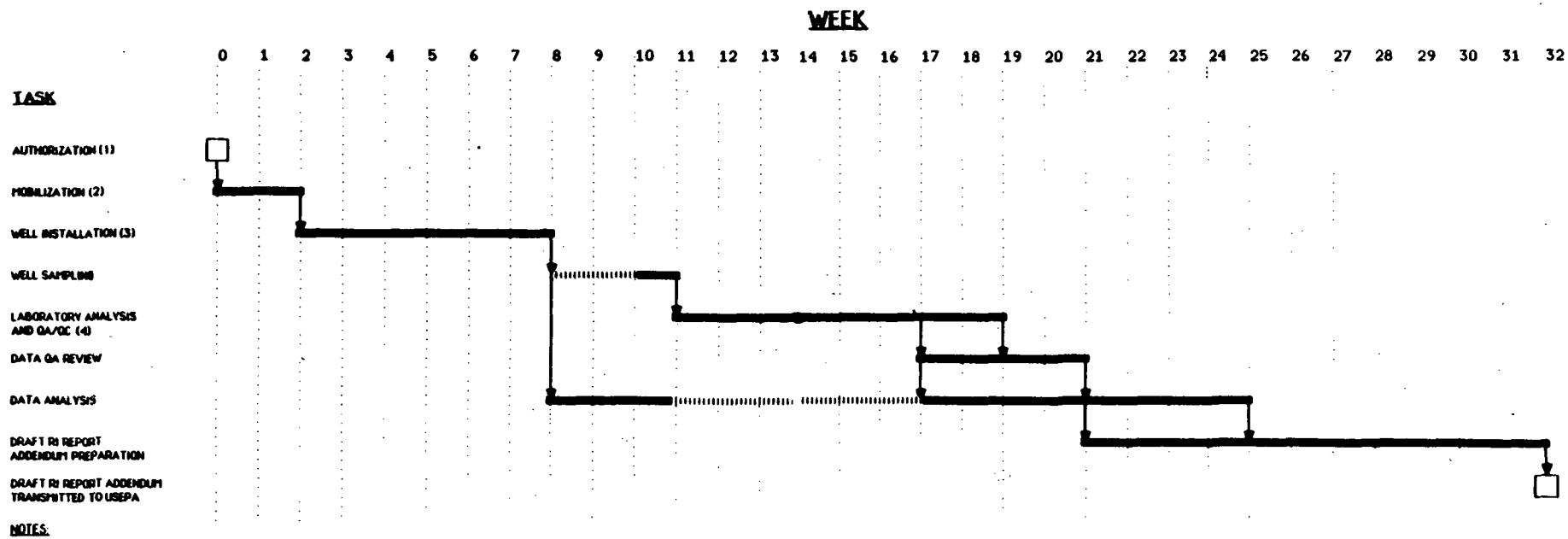
KEY:

● PROPOSED DEEP WELL LOCATIONS

Dames & Moore

FIGURE 7-9

003711



NOTES:

1. Contigent upon USEPA REGION II approval of POP Revision No 8, receipt of signed access agreement, and receipt of signed well permit applications
2. Includes Dames & Moore field crew mobilization, driller mobilization, laboratory coordination, utility check and off-site owner location approval
3. Upon completion, the wells will be surveyed by a NJ licenced surveyor
4. In this time period the wells will be slug-tested (expected duration of test: 5-6 days)
5. This schedule does not include contigency for weather delays

PROPOSED SCHEDULE
OFF-SITE REMEDIAL INVESTIGATION
SCP SITE RI/FS
CARLSTADT, NEW JERSEY

Dames & Moore